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THE USE OF MENTAL TESTS IN SCHOOL ADMINISTRATION

BY

VIRGIL E. DICKSON
DIRECTOR BUREAU OF RESEARCH AND GUIDANCE

MONOGRAPH NUMBER FOUR
JUNE, 1922

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UNIV. OF CALIFORNIA
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BERKELEY PUBLIC SCHOOLS MONOGRAPHS

From time to time as a means of recording significant progress and of promoting the progressive evolution of the various phases of public education in Berkeley, a monograph will be issued treating some phase of public school work. These monographs are designed to take the place of conventional annual reports which it is the custom of Boards of Education to issue.

1. Democratizing Teaching and Administration.
   (In preparation.)
2. Socializing Class Room Procedures.
   (In preparation.)
3. The Intermediate Schools of Berkeley.
   (In preparation.)
4. The Use of Mental Tests in School Administration—A Report of the Bureau of Research and Guidance.
   (Issued June, 1922.)
5. The Development of Continuation Education Opportunities in Berkeley.
   (Issued June, 1920.)

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Gift - Author 1923

INTRODUCTION

Within the last two or three decades the public school system has gradually grown more and more complex. Not only have studies and curricula increased in number, but school organization has become highly differentiated and the means of ministering to the needs of individual children have been greatly multiplied. Indeed, a modern school system is as marvelous an expression of complexity in education as the modern city is an expression of complexity of social life.

An accompaniment of greater complexity has been increased school costs. The greater costs are in part a result of the more varied features combined in the modern complex system. Increased costs are partly due, of course, to the gradually changing economic situation and to the higher standards of living which have been established.

The need for careful study of any enterprise or institution increases as complexity becomes greater and as costs multiply. Public schools have shown themselves responsive to this need. Within the last two decades as a result of the initial efforts of Rice, Thorndike, Strayer, and others, scientific procedures applicable to analyzing and measuring the efficiency of school procedures and the costs of the same have been developed. By this time rather satisfactory standards have been established for judging the efficiency of a school plant, the organization of a school system, the ability of children in the various subjects from grade to grade, the costs which are reasonable for various types of school work, and so on. Just as a well established business enterprise no longer relies upon rule of thumb methods nor trial and error processes, so no school system which is economically and efficiently operated may rely upon such methods.

In keeping with the foregoing considerations, the Board of Education of the Berkely Public Schools established a Bureau of Research and Guidance at the opening of the school year 1919. This bureau is responsible for conducting a continuous survey of the most pressing educational and financial problems connected with the operation of the system.

This monograph is the first printed report of the results of the work of this bureau. No effort has been made to compile a complete report of all of the efforts and activities of the Bureau of Research and Guidance. Sufficient results have been achieved, however, and sufficient services been rendered to call forth the brief report made herein. The first chapter concerns itself with a brief summary of some of the major types of work in the Berkeley Public Schools carried on by the bureau. The later chapters set forth in a scientific impersonal way the relation of measurement to efficiency in the classification and teaching of children. Both of these are central problems of large concern in the administration of schools. Hundreds of children in the schools of Berkeley have profited during the last three years in both happiness and growth as a result of the more scientific handling of them through the work of this bureau.

Our experience to date strongly justifies the faith which led to the estab-

lishment of the Bureau of Research and Guidance. Our efficiency in both organization and teaching has been much improved through its efforts. Problems of principals and teachers as well as those of the general administration have had scientific constructive attention. Not only so, but many of the teaching staff have developed good ability to employ scientific technique in their work and to apply the results of scientific study to their daily problems. Sixty-five teachers now carry certificates evidencing their ability to give mental tests as a result of the training provided through the Bureau of Research and Guidance. It is believed this monograph will render large service to the teaching staff through making available in convenient form some of the procedures and results therefrom which have been so effective in improving our efforts to serve the children of Berkeley.

H. B. Wilson,
Superintendent of Schools.

CHAPTER I.

GENERAL SCOPE AND NATURE OF THE WORK OF THE BUREAU OF RESEARCH AND GUIDANCE.

The Bureau of Research and Guidance was established in Berkeley in August, 1919. The two important functions of the Bureau are indicated in the title, (1) research, (2) guidance. By research we mean a careful and scientific study. Such studies are made of any function of the school work which the superintendent or Board of Education decides is in greatest need of attention. Guidance enters by way of recommendation or advice after research has been made and all available data analyzed. The purposes of the bureau therefore are to gather facts, to help interpret those facts, and to give counsel and advice.

With these general functions of the bureau in mind, the specific problems to which attention has been given are as follows:

1. Statistics of (a) enrollment, (b) attendance, (c) age, grade, and progress reports, (d) data on failures and extra promotion, (e) size of classes.
2. Testing program: (a) mental tests, (b) tests of subject matter and achievement, (c) training of teachers for testing.
3. Special classes.
4. School counseling program.

The work that the bureau has done relating to the problems mentioned above can not be analyzed or set forth in detail in a single report such as this. I shall mention only a few of the outstanding features.

ENROLLMENT.—Charts have been made showing the enrollment,—(a) the first week of each term, (b) each month, (c) for every classroom in the elementary school, (d) for each class in the junior high and senior high school, (e) total for each school of the city, (f) total for each grade in the city, (g) total for each division—kindergarten, elementary, junior high, and senior high. Such data are tabulated and graphed so that the administrative officers may get at a glance information necessary to the proper organization and direction of the school system.

The following table shows the enrollment in the various school divisions during the month of May for the years as indicated:

ENROLLMENT

	Kdg.	Elem.	Jr. High	High	Total
May, 1920	416	5037	2328	1170	8951
May, 1921	560	5317	2550	1730*	10157
May, 1922	563	5448	2753	2262*	11026

* Includes part time school.

ATTENDANCE.—The Attendance Department has assisted in gathering and tabulating the school census data and has looked after all problems of compulsory attendance and work permits. The magnitude of this work may be judged from the following tabulation of calls made by the attendance officer during the school year 1921-22:

	El. Schools	H. S.	Jr. H. S.	Part Time	Total
No. cases reported to Attendance Officer	128	53	203	243	627
No. calls made by Attendance Officer	186	86	337	482	1091
Cases of truancy apprehended	10	24	54	8	96

AGE-GRADE.—Age-grade reports have been tabulated according to the form used by the state for the past two years. For this report a pupil is at age who is in the first grade and is six or seven years old; in the second grade, seven or eight years old; third grade, eight or nine years old, etc. The following table gives a general summary of the under-age, at-age, and over-ageness in the elementary grades:

ELEMENTARY SCHOOL (Grades 1-6 Inc.)

	No. Pupils	Per Cent
Year 1920-21—Under-age	301	5.7
At-age	4065	77.5
Over-age	876	16.7
Year 1921-22—Under-age	380	7.2
At-age	4128	78.9
Over-age	721	13.7

NON-PROMOTION OR PUPIL FAILURES.—Studies have been made of the pupil failures at the close of each term. The following table shows the percentage of such failures for each term since June, 1919:

PERCENTAGE OF FAILURE FOR TERM ENDING

Grade	June, 1919	Jan., 1920	June, 1920	Jan., 1921	June, 1921	Jan., 1922
L-1	16.4	13.5	11.7	11.4	10.7	12.8
H-1	7.4	7.4	8.1	7.2	9.5	9.8
L-2	8.0	4.7	6.1	2.6	5.6	5.6
H-2	3.6	4.8	2.7	3.5	3.6	3.6
L-3	6.2	5.9	3.8	3.1	3.5	4.1
H-3	5.0	3.3	2.5	1.4	2.6	3.6
L-4	3.8	4.2	4.7	4.7	3.0	5.2
H-4	4.1	6.0	2.3	4.5	2.2	4.3
L-5	6.0	5.2	5.0	5.6	2.1	2.2
H-5	6.6	1.3	3.4	2.9	2.3	3.3
L-6	5.0	4.8	2.8	2.5	2.7	3.4
H-6	5.0	2.7	2.9	1.2	1.5	2.6
Total	6.6	5.5	4.7	4.4	4.3	4.7

SIZE OF CLASSES.—The size of the class unit is an important element in school costs. Small classes are expensive, large classes cannot be taught effectively. During the past three years the number of small classes has been greatly reduced. The present tendency is toward class enrollment of from thirty to thirty-five pupils. The following table reveals the size of classes

in the elementary schools one month after the term began for the years as indicated:

No. Pupils Enrolled	Number of Classrooms (Excluding Special Classes)		
	Year 1920	Year 1921	Year 1922
Less than 20	8	2	0
20-24	22	10	5
25-29	38	38	29
30-34	48	54	62
35-39	33	41	45
40-44	7	12	12
Median	30	32	34

Tests in Subject-Matter and Achievement.—A large number of tests of achievement in subject-matter have been given for the purpose of determining the standards of work being done in our schools compared with that being done in other cities, and also comparisons have been made, grade against grade, and school against school, in our own system. Such tests are used for the purpose of improving classroom instruction and are basic in the formulation and development of courses of study. During the past two years two surveys have been made in arithmetic, reading, and spelling, and one in hand-writing. Space does not permit the tabulation of these results in detail. In general the test results of the second year show marked improvement over those of the first year.

Special Classes.—Thirteen special classes have been organized in the elementary schools for children of inferior mental capacity. Children are placed in such classes only after careful study in which it is found that they cannot work satisfactorily in a regular class. In addition to these classes, approximately three hundred over-age children have been transferred (always with the recommendation of the teacher and principal, and with the consent of the parent) from the elementary schools of the city to the special classes of the Burbank Junior High School. As a result, our elementary schools have very few over-age problem cases in the regular grades. Any child may be a candidate for such transfer to the Junior High School who has reached the age of thirteen, provided the teacher and principal agree that such child can get little or no good where he is working, and also providing the mental test shows a low mentality. No child is transferred without the recommendation of the Director of the Bureau of Research and Guidance. More than ninety per cent of these pupils have made good school citizens in the Burbank Junior High. There they are exposed to all types of work and may take whatever their capacities permit.

School Counselors.—The high school, the junior high schools, and most of the elementary schools have school counselors, who devote a part of their time to teaching and a part to counseling. The main duty of the counselor is to assist the principal in the discovery and adjustment of the misfit child.

In the junior high school, during the last semester of the ninth year, each child is carefully instructed in what the senior high school has to offer. The counselors (both junior and senior high), the principal, the child, and the parent cooperate in a most careful effort to select the high school course best fitted to the needs of the child. The program carried for the first semester in the senior high school is made out and signed by the counselor and by the parent before the child graduates from the junior high school. Similar care

is given to the study of the child's needs when he goes from the elementary school to the junior high school. This system of counseling in our schools is of tremendous importance to the lives of our children.

Mental Testing.—During the past three years the Director and the Assistant Director of the Bureau of Research and Guidance have given three courses in mental testing, attended by approximately one hundred and forty of our teachers and principals. Sixty-five teachers have now been certified to do individual mental testing, and twenty-four to do group mental testing. After careful direction and observation in the giving and scoring of tests the following table illustrates the growth of the work done in mental testing during the past three years:

	Year	No. of Pupils
Individual mental tests (Stanford Revision)	1919-20	300
	1920-21	1000
	1921-22	1500
Group mental tests	1919-20	500
	1920-21	3000
	1921-22	6000

We have considered the mental test as one of the most important avenues through which to approach the study of individual differences in school children. This type of work is comparatively new in the field of school administration. Some have questioned the use of mental tests, others have thought that we have used them arbitrarily to place children here or there or elsewhere. We wish here to emphasize that it is not our purpose ever to base the placement of a child upon the result of a mental test alone. In the following chapter we shall present in detail some of the scientific data to show the reasons for the use of a mental testing program as an integral part of our public school administration. Such a program, if efficiently carried out, must result in a better adaptation of education to fit the needs of every type of child. It must result in a better plan of gradation and promotion, and a better course of study.

CHAPTER II.

MENTAL TESTING AND SCHOOL ADMINISTRATION

The Need for Better Classification of School Children.—The numerous studies and surveys made of American public schools in recent years show conclusively that past methods of administration have failed to group children satisfactorily, whether according to age, mental capacity, or ability to progress in school work. Two causes have been operative during the past decade, steadily tending to bring about wider differences than heretofore. The first of these is the increasing cost of education with consequent pressure to increase the size of classes; the second is the increase in the scope of the compulsory attendance laws, together with the vigor with which they are enforced. Our law in California compels full time attendance in regular day schools until the age of 16 years and part time attendance until high school graduation or the age of 18 years. The course of study, rate of progress, and methods of instruction now in use have been disturbed if not severely shaken by the introduction into our schools of large numbers of children who must remain until 16 years of age who formerly stayed out of school or quit early because they did not fit. Clearly some changes in methods of administration must be made if we are to meet the needs of changing conditions of education. The solution of the problem is highly important to classroom teacher, school executive, and the general public.

The following study shows the wide distribution in age and mental capacity found in the kindergarten and first grades of our public schools, and reveals both why and how mental testing* can serve school administration in meeting some of the problems resulting from such variation. Nearly all children in America enter school either in the first grade or kindergarten at the age of 5 or 6 years. The first few years in school are the most plastic years of the child's life. Habits and attitudes toward learning are formed that tend to be permanent. It is well that we look with greatest care into this important period of training. The study of individual differences and proper classification of children should begin as soon as the child enters school. Hence we base our study upon the consideration of the kindergarten and first grade child. What differences in capacity are found among these children? What do these differences imply? How reliable are tests made in kindergarten and first grade? These are some of the important questions to be considered.

* It should be kept in mind that mental tests as used in this study refer to tests of endowment or innate capacity and not to accomplishment in subject matter or skill as in multiplication or handwriting.

SECTION 1.

DISTRIBUTION OF AGES (CHRONOLOGICAL AND MENTAL) IN KINDERGARTEN AND FIRST GRADE

KINDERGARTEN—186 CHILDREN.

Figure 1 (page 13) shows the distribution found among 186 kindergarten children. The cases are unselected, involving all the children working in the kindergartens where the tests* were made; the data were compiled at about the middle of the first term spent in kindergarten work. It will be observed that the following ranges of chronological and mental ages occur:

Range of chronological age (C. A.): 4 years 4 months to 7 years 10 months.

Median=5 years 8 months.

Range of mental age (M. A.): 3 years 6 months to 8 years 4 months.

Median=5 years 10 months.

The group as a whole is normal by test results, but there is a wide spread of distribution. Theoretically the kindergarten should contain only children between 5 and 6 years of age. This group contains 8.6% below this age, and 33.3% above, while 58.1% are at age. The mental age distribution shows even less homogeneity,—15.6% below 5, 42.2% above 6, and 39.2% between 5 and 6. Less than half of these children are at age mentally for the kindergarten work.

The most significant fact to be noted is that these kindergarten children represent mental ages in six different year groups. Imagine the difficulty of the teacher who tries to put the same problems before a group of children, some of whom are mentally 3 years old, others 4, 5, 6, 7, and still others 8. To accomplish satisfactory results with a large class of children who have such a wide range of mental ability is an impossibile task and cannot be expected of any teacher, however capable she may be.

L-1 GRADE—325 CHILDREN IN SEVEN DIFFERENT SCHOOLS.

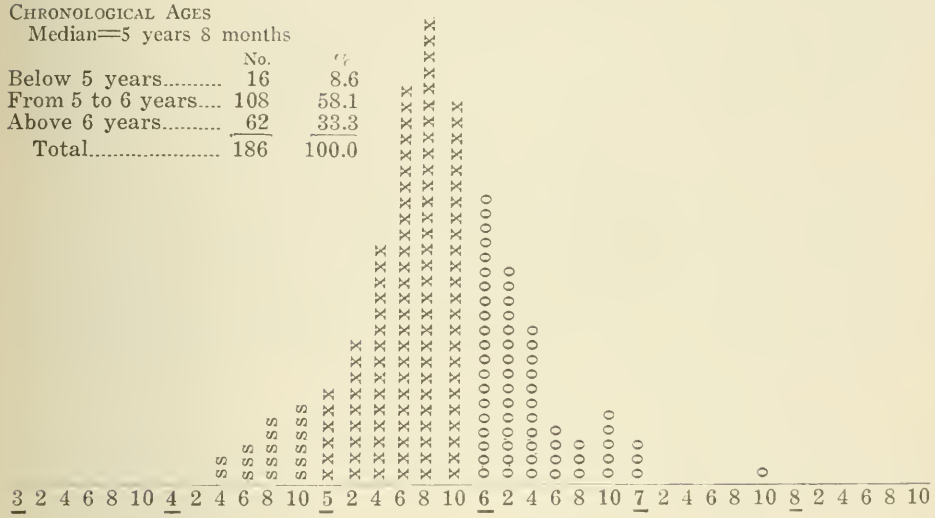
For the purpose of showing the wide range of difference in capacity in different schools, we present the mental age distributions found in the L-1 grade of several schools. Figure 2 (page 14) represents the mental age distribution of all the L-1 grade pupils found working in seven different schools. Note the marked differences existing in the ranges, as well as in the median mental ages of such schools as A, C, and G. A tabular summary of conditions follows:

School	No. Pupils	Range of M. A.	Median M. A.
A	35	3-10 to 6-10	5-8
B	110	4-2 to 9-4	6-2
C	29	5-4 to 7-10	6-4
D	23	4-6 to 7-2	6-4
E	53	5-4 to 8-10	6-6
F	47	4-6 to 8-10	6-6
G	28	5-0 to 8-8	7-0
Totals	325	3-10 to 9-4	6-4

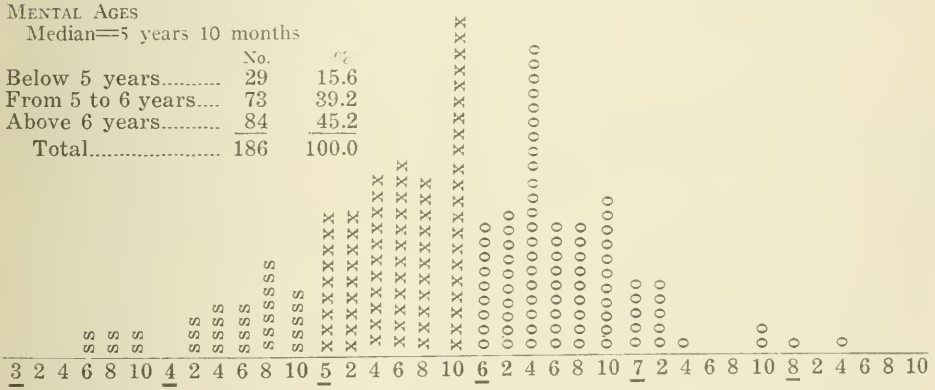
* The Stanford Revision of the Binet scale was the form used in all individual tests.

Figure 1.

DISTRIBUTION OF CHRONOLOGICAL AGES AND MENTAL AGES OF 186 KINDERGARTEN CHILDREN.



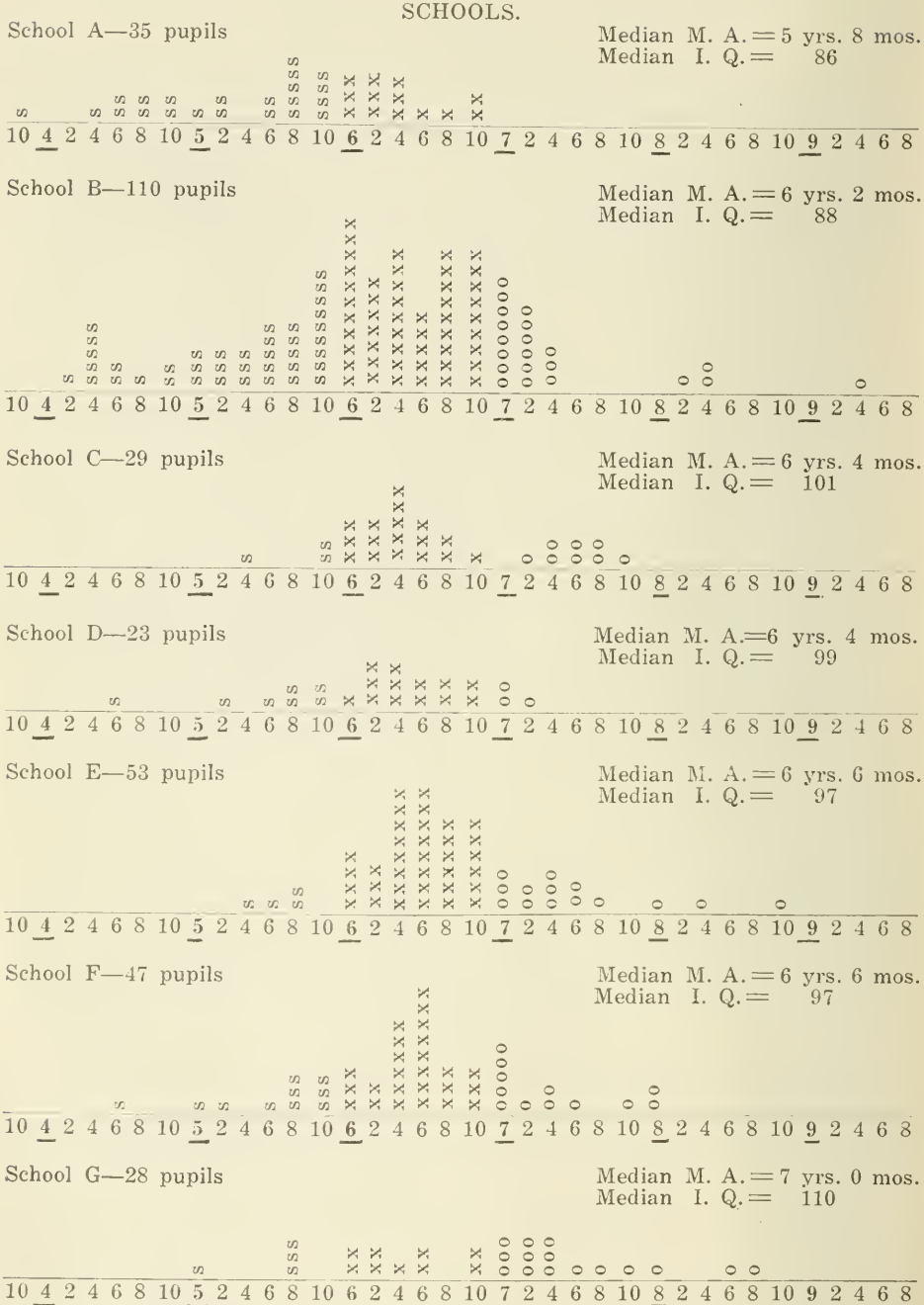
Note.—Read the table thus: 2 children were 4 years 4 months old, 3 were 4 years 6 months, 5 were 4 years 8 months, etc. The s means under age, the x means at age, the o means over age.



Note.—Read the table thus: 2 children were by mental test 3 years 6 months, 3 were 4 years 2 months, etc.

Figure 2.

DISTRIBUTION OF MENTAL AGES IN L-1 GRADE ROOMS IN SEVEN SCHOOLS.

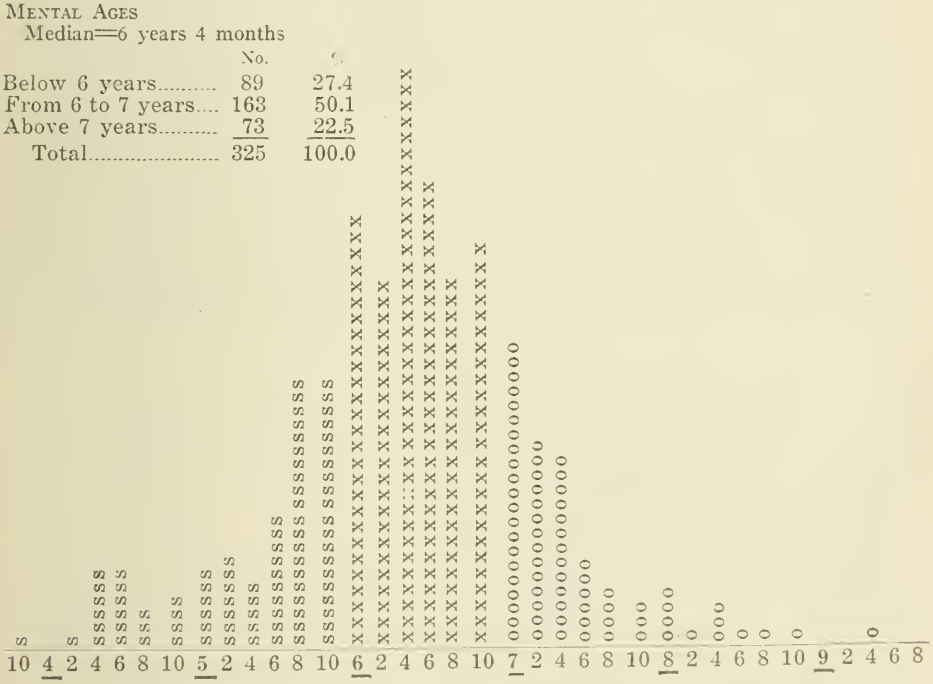


School A has 35 pupils ranging in mental age from 3 years 10 months to 6 years 10 months, the median mental age being 5 years 8 months. More than 50% of the pupils in Room A test below the 6-year mental age, while none test above the 7-year mark. On the other hand, 50% of the pupils in Room G test above 7 years mentally, thus showing a mental development equal to that found in those pupils who are mastering the work of the next grade higher. If the teachers of these two rooms were to be judged by the amount of the course of study they can get their pupils to master in the same length of time, it could easily happen that a weak teacher in Room G would be judged superior, while a strong teacher in Room A would be considered inferior. This table furnishes concrete evidence that a teacher should not be judged by the results of her work until it is known what is the "nature of the clay" with which she has to work.

Figure 3 (below) throws into one general distribution the mental ages of all the children represented in Figure 2. We find here a median mental age of 6 years 4 months, which is about the age to be expected of the child who is doing satisfactory L-1 grade work. Eighty-nine of these children, however, or 27.4% of the whole group, tested below 6 years mentally. Since first grade work is planned for the 6-year-old, these children theoretically do not belong in the first grade. In actual fact, 90% of this group below 6 failed to pass to the next grade at the end of the term. Most of the failures

Figure 3.

DISTRIBUTION OF MENTAL AGES OF 325 L-1 GRADE CHILDREN IN SEVEN SCHOOLS.



Note—Read the table thus: 1 child tested with M. A. 3 yrs. 10 mos., 1 tested 4 yrs. 2 mos., 6 tested 4 yrs. 4 mos., etc.

in the first year of school work come from that class of children who, according to test results, have not yet reached the mental age necessary to master the first grade work without an unusual amount of time or personal attention.

On the other hand, 73 children of this same group, or 22.5% of the whole, revealed a mental ability above the 7-year level, and hence were not working up to their full capacity while placed in the L-1 grade. The marking of time in the receiving classes by such superior children, who should be progressing at a rate commensurate with their mentality, is one of the serious danger points of our educational program. Lacking sufficient work to keep them busy, they get into mischief or daudle at their tasks while interest in school tends to grow dull. Opportunity should be afforded such children either for enrichment of the course of study or for more rapid progress.

235 L-1 Grade Children.

A second group of L-1 grade pupils, tested during the first eight weeks of another school year, affords the opportunity for a comparison of the mental and chronological ages at the time of the test; Figure 4 (page 17) represents such distributions. The same facts are evident that have already appeared: i. e., the wide range existing in both distributions and the large percentage of children whose mental capacities are not equal to the demands made upon them for first grade work. The group shown in Figure 3 had 27.4% below 6 mentally, while this group has 35.7% below 6. This group shows 22.1% above 7, which is almost identical with the percentage above 7 in Figure 3.

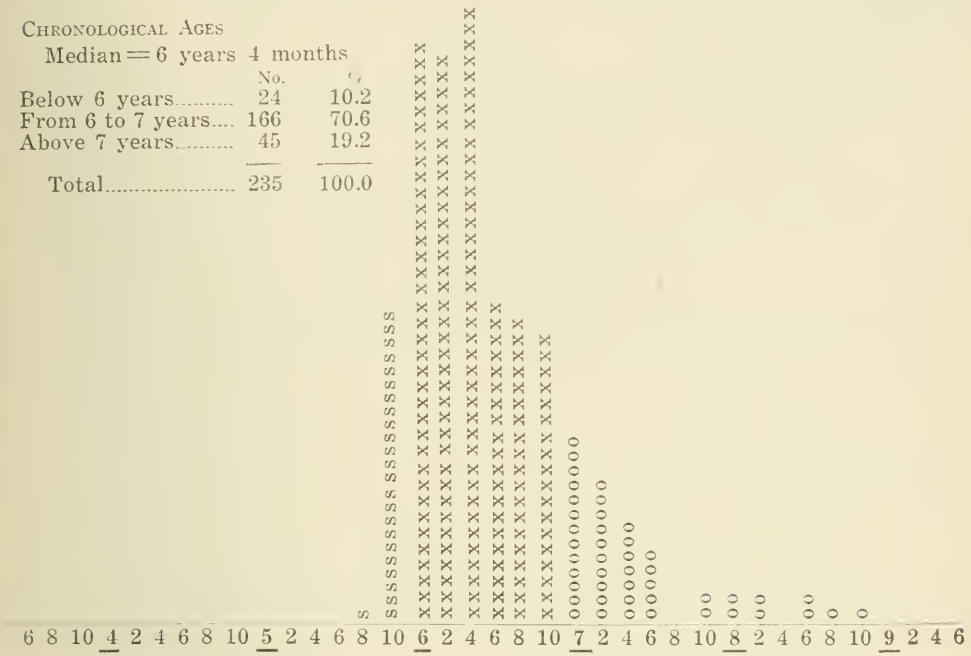
Here the table reveals a greater percentage of cases in the upper year levels of chronological age than was found in the kindergarten table. The reason for this is evident; as a rule, except in most serious cases of mental inferiority, a child does not remain in the kindergarten after he has passed the age of 6 years; at that time he enters the first grade by legal right regardless of what his capacity has proven to be. Unhappily, however, if his mentality is low, he remains in that first grade term after term unless some special provision is made for him in a segregated class. Hence it frequently happens that 7- or 8-year-old children are found working by the side of the tiny 6-year-old beginner. I found one 12-year-old in the first grade who had started to school the same year most of his classmates were born. Note also that the lower end of the distribution of chronological ages in Fig. 4 ends abrouptly at 5 years 10 months. This is due to the law requiring a child to be within three months of 6 years before he can be registered in the first grade.

Pupils Testing Below 6 Years Mentally.

In this group of 235 L-1 grade children 84, or 35.7%, tested below the age of 6 years mentally. Figure 5 (page 18) shows the distribution of the chronological and mental ages of these children. Note that the median C. A. of this group is 6 years 2 months, while the median M. A. is only 5 years 4 months, with a median intelligence quotient (I. Q.) of 86. A gap of almost a year exists between the average mental capacity of these children and that of a normal group in the first grade. It is not surprising, therefore, that they should be reported as doing unsatisfactory work. All were reported by their teachers as either below average in work or repeating the grade. Children who test below 6 years mentally are almost never ready to attempt the regular first grade work with a regular class under standard conditions.

Figure 4.

DISTRIBUTION OF CHRONOLOGICAL AGES AND MENTAL AGES OF 235 L-1 GRADE CHILDREN



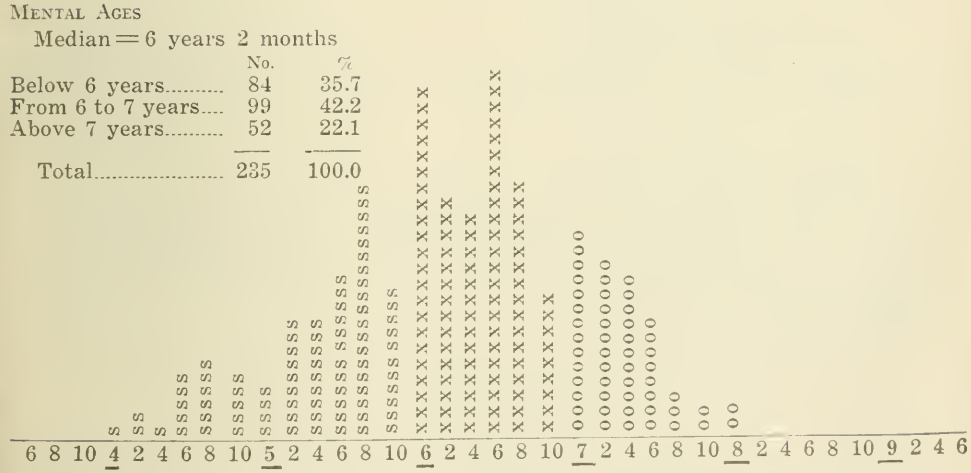
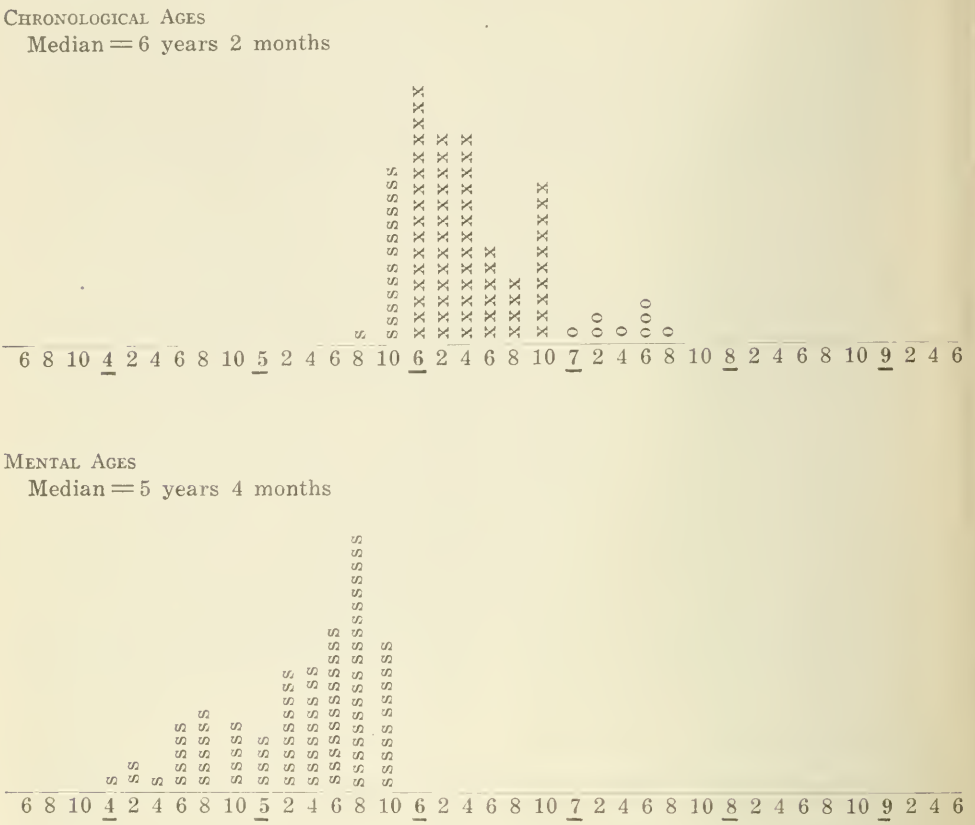


Figure 5.

DISTRIBUTION OF CHRONOLOGICAL AGES AND MENTAL AGES OF 84 L-1 CHILDREN WHO TESTED BELOW 6 MENTALLY.



H-1 Grade—171 Children.

Figure 6 (page 19) shows the ages, both chronological and mental, of 171 H-1 grade children. These children represent schools in the sections of the city where the percentage of foreign born is very high and the social status low. Here is a marked example of what often happens before the first grade of our school program has been completed by children who are mentally inferior.

Observe the contrast in the ranges and medians of the C. A. and M. A.:

C. A. — Range = 5–10 to 12–2
Median = 7–6

M. A. — Range = 4–8 to 9–0
Median = 6–6

Thirty-three of these children (19.3% of the group) tested below 6 years

mentally, while only one child was below 6 chronologically, but with a mental age so far advanced that he was given the opportunity to work at his own rate of capacity.

At the other end of the scale were 116 children (67.8%) who were older than 7 years in chronological age, some of them reaching the 9, 10, 11, and even 12 year group before being promoted from the H-1 grade. Their

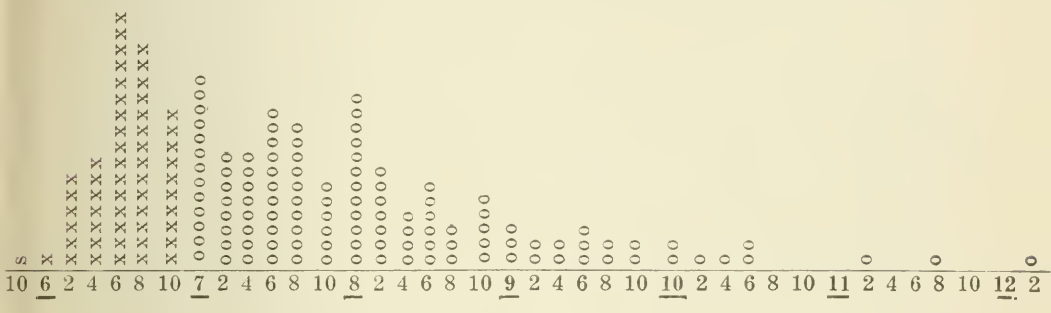
Figure 6.

DISTRIBUTION OF CHRONOLOGICAL AGES AND MENTAL AGES OF 171 H-1 GRADE CHILDREN.

Chronological Ages

Median = 7 years 6 months

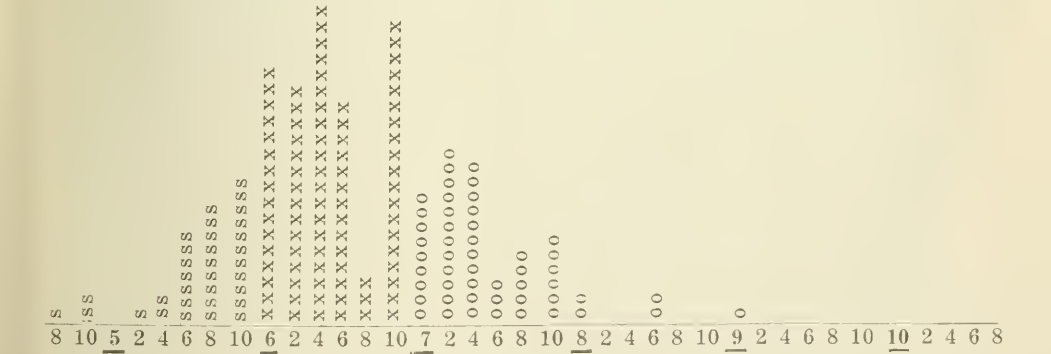
	No.	%
Below 6 years	1	0.6
From 6 to 7 years	54	31.6
Above 7 years	116	67.8
Total	171	100.0



Mental Ages

Median = 6 years 6 months

	No.	%
Below 6 years	33	19.3
From 6 to 7 years	87	50.9
Above 7 years	51	29.8
Total	171	100.0



capacity was not equal to first grade work, but they have been required to try it and fail and repeat for two, three, or four years. (A change in *requirements* should be *required*.) This is a condition which is in most serious need of readjustment in our educational program, in order that these children who have been endowed with limited or even inferior capacity may not be held back in the primary grades until, in their discouragement, they chafe under compulsory school attendance and develop an attitude of antagonism and rebellion toward the whole system. A solution of the problem has been at least partially worked out through the organization of special classes for the mentally inferior, which will be discussed in a later section.

SECTION 2.

RELIABILITY OF TESTS FOR PROGNOSIS

How Nearly Does the Mental Test Show What a Child Is Able to Do In School?

The previous section has analyzed and discussed the mental ages of children in the kindergarten and first grade as determined by the individual mental test. Just how far this mental test can be relied upon for a correct diagnosis of the capacity of these children is the next problem for consideration. Out of each grade of children whose mental ages have been analyzed (i. e., kindergarten, L-1, and H-1), from 75 to 100 cases were found in the same school two years after the time of testing. Following is a study of the rate of school progress during that time in relation to both the mental age and the intelligence quotient.

PROGNOSIS ON THE BASIS OF I. Q.

Kindergarten Children.

Of the 186 kindergarten children originally studied with reference to C. A. and M. A., 76 were located in the schools two years after the test had been given. These children were first divided into three groups according to their intelligence quotients: (1) Below 90; (2) 90 to 109; (3) 110 and above. The progress of each child for two years was then traced, and again three divisions were made: (1) slow; (2) normal; (3) rapid.* The following table indicates the type of progress made by the children with various intelligence quotients:

I. Q.	Slow		Normal		Rapid		Total	
	No.	%	No.	%	No.	%	No.	%
Below 90	13	76.5	4	23.5	0	0.0	17	22.3
90-109	8	32.0	15	60.0	2	8.0	25	32.9
110 and above	3	8.8	20	58.8	11	32.4	34	44.8
Total	24	31.6	39	51.3	13	17.1	76	100.0

Note.—Read the table thus: of 17 kindergarten children testing below 90 I. Q., 13 were retarded one term or more during the first two years of the school program; 4 made normal progress; none were accelerated, etc.

* A child is considered as having made "slow" progress if he has failed of promotion one or more terms during the two years following the test; he has made "normal" progress if he has moved on regularly at the rate of one-half grade each term; he has made "rapid" progress if he has been able at any time during the two years to cover more than one term's work in six months.

Observe in the preceding table how the percentage of retardation decreases as the intelligent quotient increases; i. e., from 76.5% for those testing below 90 I. Q. to 8.8% for those testing 110 I. Q. or above. On the other hand, note the percentage of acceleration for the superior children (32.4%) as compared with its total absence for the inferior group. Of the group of children testing from 90 to 109 I. Q., representing those having normal capacity, 60.0% have also made normal progress. It is true that the intelligence quotient, of itself, can never be used to determine the grade in which a child shall work; the important factor is, of course, the mental age of a child. The general trend, however, as indicated by the table, is evident; i. e., that an inferior I. Q., as determined by a mental test given in the kindergarten, usually means retardation at the very beginning of a child's school life, while a superior I. Q. means at least normal advancement, with possibility of acceleration if provision for it is made. The mental test furnishes a valuable index for a child's chances for success in school work.

L-1 Grade Children.

Of the 235 children studied in the L-1 grade, 95 were traced for two years, with the following results:

I. Q.	Slow		Normal		Rapid		Total	
	No.	%	No.	%	No.	%	No.	%
Below 90	27	87.1	4	12.9	0	0.0	31	32.6
90-109	18	36.7	26	53.1	5	10.2	49	51.6
100 and above	0	0.0	7	46.6	8	53.4	15	15.8
Total	45	47.4	37	38.9	13	13.7	95	100.0

The above table reveals an even higher degree of reliability of prognosis for the mental test than appeared for kindergarten children. Here 87.1% of the children testing below 90 I. Q. show retardation during the two years following the test; of the 4 who proceeded at normal rate, 2 were very much over-age at the time of the test, and hence had the advantage of previous experience in school work. At the other end of the scale, the 15 children who tested 110 or above all made either normal or rapid progress, with no retardation occurring in any case. As with the kindergarten group, so here an I. Q. of from 90 to 109 appears slightly more uncertain in predicting progress than those either below or above this figure, and naturally so. This represents the group of children of average capacity, but with whom other factors, such as health, school attendance, industry, and various environmental conditions may influence progress, usually toward retardation; the chances are a little more than 3 to 1 that children of this group will be retarded rather than accelerated. Here in the L-1 grade the chances for acceleration were 10 out of 100; in kindergarten they were 8 out of 100.

H-1 Grade Children.

Of the 171 H-1 grade children, 90 were found in the same school two years later. The following table shows their progress:

I. Q.	Slow		Normal		Rapid		Total	
	No.	%	No.	%	No.	%	No.	%
Below 90	44	86.3	6	11.8	1	1.9	51	56.6
90-109	16	48.5	12	36.3	5	15.2	33	36.7
110 and above	0	0.0	1	16.7	5	83.3	6	6.7
Total	60	66.7	19	21.1	11	12.2	90	100.0

This group of 90 H-1 grade children included a larger number of pupils of inferior capacity than did either the kindergarten group or L-1 group. However, the same general conclusions can be reached which have already been given in consideration of those groups. The child in H-1 grade with an I. Q. below 90 had 86 chances out of 100 for failure of regular promotions in the next two years, with only 2 chances out of 100 for rapid promotion. On the other hand, the child with an I. Q. of 110 or above had 83 chances out of 100 for rapid advancement and no chance of failure. The very fact that this group as a whole is below normal in capacity tends to make the superior child stand out by way of contrast, thus bringing him in line more certainly for rapid advancement.

52 L-1 and H-1 Grade Cases.

Additional evidence, corroborating the results of the foregoing studies covering a period of two years, comes from an examination of 52 L-1 and H-1 grade cases, which were followed up for a period of four and a half years. These were likewise considered with reference to school progress in its relation to I. Q. and M. A., as determined at the beginning of the follow-up work. The table below gives the general percentages of slow, normal, and rapid progress during the four and a half years, figures which, while coming from a group limited in number, are nevertheless significant because of the longer follow-up period:

I. Q.	Slow		Normal		Rapid		Total	
	No.	%	No.	%	No.	%	No.	%
Below 90	35	94.6	2	5.4	0	0.0	37	71.1
90-109	6	50.0	6	50.0	0	0.0	12	23.1
110 and above	0	0.0	2	66.7	1	33.3	3	5.8
Total	41	78.8	10	19.2	1	1.9	52	100.0

Superior children are almost entirely lacking in this group; however, the very heavy percentage of retardation for pupils testing below 90, and the even division of slow and normal progress for those testing from 90 to 109 give added authority to the previous figures cited for kindergarten, L-1, and H-1 grade pupils who were followed for only two years.

Comparison of Kindergarten, L-1, and H-1 Grade Tests as to Reliability for Prognosis.

Further comparison of the tables presented for kindergarten, L-1, and H-1 grades points to the conclusion that tests made in the kindergarten are slightly more doubtful in predicting school progress than those made in either L-1 or H-1 grade. The following comparative table gives the data for the three grades involved:

		No. Cases	Slow %	Normal %	Rapid %
I. Q. below 90—	Kgn.	17	76.5	23.5	0.0
	L-1	31	87.1	12.9	0.0
	H-1	51	86.3	11.8	1.9
Total		99	84.9	14.1	1.0
I. Q. 90-109—	Kgn.	25	32.0	60.0	8.0
	L-1	49	36.7	53.1	10.2
	H-1	33	48.5	36.3	15.2
Total		107	39.3	49.5	11.2
I. Q. 110 and above—	Kgn.	34	8.8	58.8	32.4
	L-1	15	0.0	46.6	53.4
	H-1	6	0.0	16.7	83.3
Total		55	5.4	50.9	43.7

Note from the above table the following facts:

1. The percentage of slow progress for children testing below 90 I. Q. is not so large for the kindergarten group as for either one of the other two.

2. Some retardation is evident for kindergarten children testing 110 or above, while none appears for children of similar intelligence in the L-1 or H-1 grade.

3. The kindergarten group shows fewer of its superior children making rapid progress than do the other two groups.

4. The percentage of kindergarten children in each range of intelligence level progressing at the normal rate is larger than is found in the L-1 or H-1 grade.

5. The intelligence test made in the kindergarten, therefore, appears not to differentiate as well as in the first grade with reference to progress to be expected for the next two years.

General Conclusions.

General conclusions made from this study of intelligence quotients can be given as follows:

1. The child in the kindergarten or first grade with an I. Q. below 90 has little chance for proceeding at the regular pace under present standard conditions of teaching and curriculum development.

2. The child with an I. Q. of 90 to 109 more often than not proceeds at the normal rate, but with definite danger of retardation under adverse environmental conditions.

3. The child with an I. Q. of 110 or above suffers little or no danger of retardation and has real chance for acceleration if opportunity is provided.

PROGNOSIS ON THE BASIS OF MENTAL AGE

It has already been said that mental age is the most important single factor in determining the grade in which a child can work satisfactorily; we

proceed therefore to a consideration of the mental ages of the children concerned in relation to their grade placement.

The intelligence quotient of the child, which was determined in the kindergarten, L-1, or H-1 grade and which remains relatively constant, was used as a basis of computation. Since the follow-up work covered two years' time, each child was chronologically two years older at the end of the follow-up period than at the time when the test was made. In each case this chronological age of the child at the close of follow-up work was used along with his intelligence quotient to compute his mental age at the end of the follow-up period; the following formula is the one used for this computation:

I. Q. x C. A. (at end of follow-up period) = M. A. (at end of follow-up period).

The child's mental age thus computed was compared with his grade location, and he was rated accordingly as mentally over-age, at-age, or under-age.* The following figures show the conditions two years after the test was given:

	— Mentally —						
	Over-age		At-age		Under-age		Total
Children tested in	No.	%	No.	%	No.	%	No.
Kindergarten	31	40.8	35	46.0	10	13.2	76
L-1	31	32.6	46	48.5	18	18.9	95
H-1	12	13.3	40	44.4	38	42.2	90

A comparison of the figures for the children tested in each of the three grades shows one important point in which they all agree, i. e., that from 45% to 50% of the children concerned, two years after being tested, were in the grade in which their mental ages would place them, regardless of chronological age. The other 50% (approximately) were divided between the mentally over-age and under-age groups in general proportion to the number of inferior and superior capacities that were found among them. In the kindergarten group of 76 children, where 45% of them had I. Q.'s of 110 or above, 40.8% were found two years later to have a mental age above that of the grade in which they were working, while only 13.2% were mentally under-age. According to M. A., then, 40% of these kindergarten children had not been worked up to capacity. In the L-1 grade, where the number of superior children was less and the number of inferior children greater, there was a corresponding decrease in the mentally over-age and an increase in the mentally under-age pupils two years after the test was given. Finally, in the H-1 grade, in which there was a predominance of inferiority (56.6% having an I. Q. below 90), there appeared, after two years' time, mental under-ageness in 42.2% of the group, while only 13.3% were mentally over-age. Note the almost exact reversal of percentages in the mentally over-age and under-age groups of the kindergarten and H-1 grades. The situation is due to the difference existing in the capacities of these two groups as originally tested. Where mental superiority exists in a large

* The following table indicates the ages of children who have been considered mentally "at-age" for a given grade:

Grade	Mental Age	Grade	Mental Age
L-1:	5-9 to 6-9	H-3:	8-3 to 9-3
H-1:	6-3 to 7-3	L-4:	8-9 to 9-9
L-2:	6-9 to 7-9	H-4:	9-3 to 10-3
H-2:	7-3 to 8-3	L-5:	9-9 to 10-9
L-3:	7-9 to 8-9	H-5:	10-3 to 11-3

measure, as in this group of kindergarten children, and insufficient opportunity is given for acceleration, there must necessarily develop in the course of a few years a large amount of mental over-ageness; on the other hand, where inferiority predominates, as in the H-1 group concerned, and desperate efforts are made by the teachers to pull along with them all that can possibly make any progress at all, particularly those who are chronologically over-age, there must become more and more marked the percentage of the mentally under-age pupils, who do not possess the real capacity to master the work of the grade to which they have been assigned. It is significant that in this H-1 grade group, where the largest percentage of mental under-ageness existed two years after the test was given, 27 of the 38 pupils designated as mentally under-age were rated by the teachers as inferior or very inferior in school work. Evidently they had been carried along because of their chronological age or other conditions, despite their inability to do the standard work of the grade. In the kindergarten group, where the greatest amount of mental over-ageness was found, 20 of the 31 pupils who were above their grade in mental age were rated by their teachers as superior or very superior in school work. In from 75% to 80% of the cases involved in each group, the mental test made in the kindergarten, L-1, or H-1 grade has made a reliable prediction of the child's school progress as shown two years later by one of three conditions:

1. Grade location in agreement with M. A.
2. Grade location above mental age capacity, with resulting marked inferiority of school work.
3. Grade location below mental age capacity, with accompanying superiority of school work.

52 L-1 and H-1 Cases.

Again for the group of 52 L-1 and H-1 grade children who were followed for four and a half years of school progress, similar statements can be made as to prediction of school success on the basis of careful study and mental testing in the first grade. Such prediction was actually made for each individual case at the time of testing, with the following results:

1. The progress made by the child (i. e., slow, normal, or rapid) was predicted correctly in 77.8% of cases studied.

2. Of the 12 cases where disagreement existed between prediction and actual progress, all but 2 can be explained on the basis of absence, illness, or unsatisfactory home conditions.

3. In a total of 50 cases, or 96% of the whole number, therefore, predictions made in the first grade of progress to be made during the following four years either were realized in the school life of the child or failed of realization through some known factor other than the mental capacity of the child.

Correlation Between Mental Age and School Work.

That a general relationship exists between a child's mental age and his school success is evident from the foregoing considerations. An actual figure

of correlation was worked out, however, for 149 first grade children. Previous to the test they were rated by their teachers as to the quality of their school accomplishment according to the following scale:

A—Very superior school work
B—Superior school work
C—Average school work
D—Inferior school work
E—Very inferior school work

The figures below show that the relationship between the mental age of a first grade child and the quality of his school work as judged by his teachers is a very definite one. The coefficient of correlation is +.725 (Pearson). Of the 57 children who tested below six years mentally, as shown in the table below, 44 were doing inferior work, whereas 70 of the 92 children who tested six years or above were rated as average or better. In short, there is again a clear indication that children who are below six years in mentality find it very difficult to do work that is satisfactory in the first grade, and are more likely to do inferior or very inferior work. Thus they are beginning their school experience with a serious handicap, which pursues them throughout the grades, often until such time as they can by any means whatever escape the bondage of lessons beyond their ability by dropping out of school.

SHOWING CORRELATION BETWEEN M. A. AND QUALITY OF SCHOOL WORK FOR 149 FIRST GRADE CHILDREN.

Mental Age	Quality of School Work					
	E	D	C	B	A	Total
9-6 and up					3	3
9-0 to 9-5						
8-6 to 8-11				1	1	2
8-0 to 8-5		1		1	2	4
7-6 to 7-11			5	1		6
7-0 to 7-5		6	10	7	3	26
6-6 to 6-11		9	18	3		30
6-0 to 6-5		6	14	1		21
5-6 to 5-11	3	7	7			17
5-0 to 5-5	4	6	4			14
4-6 to 4-11	8	7	2			17
—- to 4-5	7	2				9
Total	22	44	60	14	9	149

Correlation .725 (Pearson).

Note.—Read the table thus: The 3 children testing mentally 9-6 or above were rated very superior (A) in school work; of those testing below 4-6, 7 were rated very inferior (E), and 2 were rated inferior (D) in school work.

DISAGREEMENTS BETWEEN TEST RESULTS AND SCHOOL SUCCESS.

Of the combined numbers of L-1 and H-1 grade children considered thus far, 756 were used as the basis for studying the total percentages of agreements and disagreements between test results and general school success as indicated by the progress made and marks earned in the first grade.

The basis for determining agreement or disagreement was the I. Q. in its relation to age, school progress, and quality of school work. The following shows the conditions expected from children testing at different levels and which were taken as standards by which to judge each child's school record:

I. Q. below 90:	Slow progress, over-ageness, or unsatisfactory* school work.
I. Q. 90 - 109:	Normal progress and satisfactory* school work.
I. Q. 110 or above:	Rapid progress or superior* school work.

The following figures show the numbers and percentages of agreements and disagreements between test results and progress of the 756 pupils concerned:

	No.	%
Agreements	650	86.0
Disagreements explained	72	9.5
Disagreements not explained	26	3.4
Follow-up data not available	8	1.1
Total	756	100.0

The significant point of this analysis lies in the fact that out of 756 children tested there was actual unexplained disagreement in only 26 cases, or 3.4% of the whole number. Let us study next the causes of the disagreements that were explained by the teachers. For this purpose two divisions have been made: (1) those children doing poorer work than would be expected from test results; (2) those children doing better work than would be expected from test results. The following table shows this analysis:

Analysis of Teachers' Explanations of Disagreements

	No.	%
(1) Children doing poorer work than expected—		
Lack of application	20	36.4
Absence (whatever cause)	11	20.0
Sickness or bad physical condition	7	13.0
Lack of power to concentrate	4	7.2
Home conditions poor	3	5.4
Defective hearing	1	1.8
Slow	2	3.6
Retiring or oversensitive	3	5.4
Repeated at request of parent	1	1.8
Language difficulty	1	1.8
Chronological age wrong	1	1.8
Immature	1	1.8
Total	55	100.0
(2) Children doing better work than expected—		
Excellent application and attendance	9	52.9
Language difficulty vitiates test	3	17.6
Promoted because of being over-age	3	17.6
Chronological age wrong	1	5.9
†Mechanically minded	1	5.9
Total	17	99.9

Total number explained disagreements = 72.

* Quality of school work was determined from teachers' ratings made according to 5-point scale given on page 26. D or E represents unsatisfactory work; A or B superior; C or above, satisfactory.

† Just what teachers meant is not clear in all cases. I include them as given.

A glance at the above table will indicate the importance of application and industry as factors in school success; "lack of application" (36.4%), "excellent application" (52.9%) explain a very large percentage of the disagreements between school progress and test results.—Among those pupils doing poorer work than was expected two explanations, i. e., "lack of application" and "absence" account for more than half the cases; "bad physical condition" accounts for 13.0% more. In the group that makes better progress than was expected, 52.9% did so by "excellent application." Many of the other disagreements are really not disagreements at all; for where a chronological age is given incorrectly at the time of the test, or where a child is promoted because of being over-age regardless of his mental capacity, one can not consider that the value of the test has been vitiated. In summarizing conditions, it can be said that 72% of all disagreements occurring were explained by a personal follow-up or investigation of the individuals concerning whom the disagreement occurred. This brings the combined percentages of agreements or explained disagreements up to the 95% mark, i. e., 722 out of 756 cases. This certainly is conclusive evidence of the value of mental tests in analyzing a child's school ability and in predicting his school progress.

SECTION 3.

GRADE LOCATION, AS RELATED TO MENTAL AGE AND CHRONOLOGICAL AGE

The follow-up work carried on for several years in three of the groups studied has made it possible to make a comparison between the chronological age and mental age two years after the test was made with reference to grade location. In each case the mental age at the end of the two-year follow-up was computed as indicated on page 24. At this time the children concerned (kindergarten, L-1, and H-1) would be in the H-2, L-3, or H-3 grade, respectively, if they progressed normally at the rate of one-half grade per term; repetition of a grade or acceleration at any time would definitely influence the general relationship of grade location to C. A. and M. A. at the close of the two years.

The following table gives the summary of conditions as they were found for each group studied:

MENTAL AGE VS. CHRONOLOGICAL AGE.

M. A.	C. A.	Kgn. Group No.	Kgn. Group %	L-1 Group No.	L-1 Group %	H-1 Group No.	H-1 Group %	Total No.	Total %
1. At-age	At-age	20	26.3	21	22.1	11	12.2	52	19.9
	Over-age	8	10.5	20	21.1	25	27.8	53	20.3
	Under-age	7	9.2	5	5.3	4	4.4	16	6.1
	Total	35	46.0	46	48.5	40	44.4	121	46.3
2. Over-age	At-age	18	23.7	11	11.6	4	4.4	33	12.6
	Over-age	9	11.8	16	16.8	8	8.9	33	12.6
	Under-age	4	5.3	4	4.2	0	0.0	8	3.1
	Total	31	40.8	31	32.6	12	13.3	74	28.3
3. Under-age	At-age	1	1.3	6	6.3	7	7.8	14	5.3
	Over-age	9	11.9	9	9.4	28	31.1	46	17.6
	Under-age	0	0.0	3	3.2	3	3.3	6	2.5
	Total	10	13.2	18	18.9	38	42.2	66	25.4
	Final totals	76	29.1	95	36.4	90	34.5	261	100.0

Note.—Read the table thus: In the kindergarten group of 76 children, 35 were mentally at age, 31 were mentally over-age, and 10 were mentally under-age for the grade in which they were working two years after the test. Of the 35 who were mentally at age for the grade, 20 were also choronologically at age for the grade, 8 were chronologically over-age, and 7 were chronologically under-age; etc.

An analysis of the preceding table leads to the following conclusions that merit special thought:

1. In the second and third grades, after two years' follow-up, 46.3% of these children are working in the class where their mental ages would place them. The rest are either attempting to do work which is beyond their capacity or are mentally capable of being accelerated beyond the class in which they are actually placed. (See sec. 1 of the table.)

2. Seventeen and six-tenths per cent of the entire number of pupils studied in the three grades concerned have been pushed on because of chronological over-ageness of from one to four years, even though mental capacity has not reached that required for the grade in which they are placed. An additional 7.8%, while being at-age or even under-age chronologically, are still under-age in mentality, and have reached the grade in which they are working not by virtue of inherent capacity, but through any one or more of the following factors: age, hard application, excessive help, personality, social status. (See sec. 3 of the table.)

3. Twenty-eight and three-tenths per cent of the whole number have not been given the opportunity to reach in school placement the level of their intellectual capacity. Chronologically most of them are either at-age or over-age, but mentally they are equal to an acceleration bringing them nearer to the utilization of complete mental power. Particularly in need of attention are those children (12.6%) who are over-age both chronologically and mentally,—a fact which indicates that they have been retarded, not through lack of capacity, but because of absence, ill health, or other environmental condition, even though ability is equal to normal progress or better. This is one of our most serious types of maladjustment, every occurrence of which

should be studied carefully with a view to proper placement, and the consequent elimination of all retardation which is not due to mental inferiority. (See sec. 2 of the table.)

4. Fifty and five-tenths per cent of the entire number of children considered are chronologically over-age; in 37.9 % of the cases the condition is due to lack of capacity; in the other 12.6% it has been caused through other environmental conditions.

SECTION 4.

RELIABILITY OF THE INDIVIDUAL TEST AS SHOWN BY RETESTS OF THE SAME CHILD

Evidence thus far presented has emphasized the mental age as the most important single criterion in determining the grade location of a child in school. Such mental age has been determined by means of an individual intelligence test. That the results of the test are reliable is shown by the close correlation found to exist between mental age and school success.

A further step in our investigation lies in a study of the reliability of the test as shown by the results accruing from two tests given at different times to the same child. To what extent do the intelligence quotients found in the two different tests agree? Two hundred and eighty-eight pairs of test blanks (each pair of two tests having been given at different times to the same child), made by a group of 84 different examiners, have formed the basis for investigation of this important question. An analysis of the cases studied follows:

AGE—Range at time of first test = 4 years to 16 years; 83% of the children concerned were less than 10 years of age at the time of the first test.

INTELLIGENCE—Range of I. Q. in first test = 33 to 136. Range of I. Q. in second test = 33 to 140. Median I. Q. of each complete set of tests=86.

INTERVAL OF TIME—Range = less than 1 month to 3 years. Median interval of time = 13.0 months.

EXAMINERS GIVING THE TESTS:

A system of training is in current use in this city whereby certification for mental testing is granted a teacher in the department after (1) a lecture and discussion course in mental testing has been completed; (2) a sufficient number of tests have been submitted for correction to insure the examiner's familiarity with the technique of recording and scoring responses; (3) observation of a test given by the candidate for certification has indicated accurate knowledge of the formulae involved as well as ability to come into satisfactory rapport with the child.

Under such a system of training it is inevitable that numerous test blanks should find their way into the files at the central office which represent work done at a very early stage of the examiner's experience in the actual giving

of tests. In these cases indication is always made on the blank accordingly, as a caution against relying too much upon its accuracy. All such tests, however, were included in the study of retests, with the result that in 50% of the cases either one or both of the examinations involving the same child were made by an examiner who was still under training, whether in its early stages or shortly before certification. Without exception, however, the lecture and discussion course in mental testing had been completed or almost completed before actual testing was begun.

A detailed study of the 288 pairs of tests involved reveals the following general facts:

1. Coefficient of correlation (Pearson) = .90*
2. Median difference in I. Q. = 5.1 pts.
3. Average difference in I. Q. = 5.6 "
4. Central tendency of change = +0.5 " †
5. Middle 50% of changes = −5.6 " to +4.4 pts.†
6. Distribution according to number of points difference in I. Q.:

No. pts. difference	% Tests	
0 — 5	53.8	88.2
6 — 10	34.4	
11 — 15	5.8	11.8
16 — 20	3.9	
More than 20	2.1	

It will be noticed that only in 11.8% of the 288 cases does the difference in I. Q. exceed 10 pts.‡ The central tendency of change in the I. Q. from the first to the second test result is only one-half of a point above the zero line (+0.5), with a middle 50% range of all differences extending from — 5.6 to + 4.4. Considering the whole number of tests, there seems to be no indication therefore that the result of the second test is apt to be higher or lower than that of the first.

Analysis of Cases Differing by More Than 10 Points.

Thirty-four cases, or 11.8% of the whole number of tests studied, show a difference in the I. Q. of the first and second tests of more than 10 points. The largest positive difference is 25, and the largest negative change is 19, with a median of 14.5 points difference in the whole series of 34 tests. Several questions are important in analyzing this group; i. e.:

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* cf. also findings of other investigators, given in J. Ed. Psych., Sept., 1921, as follows:

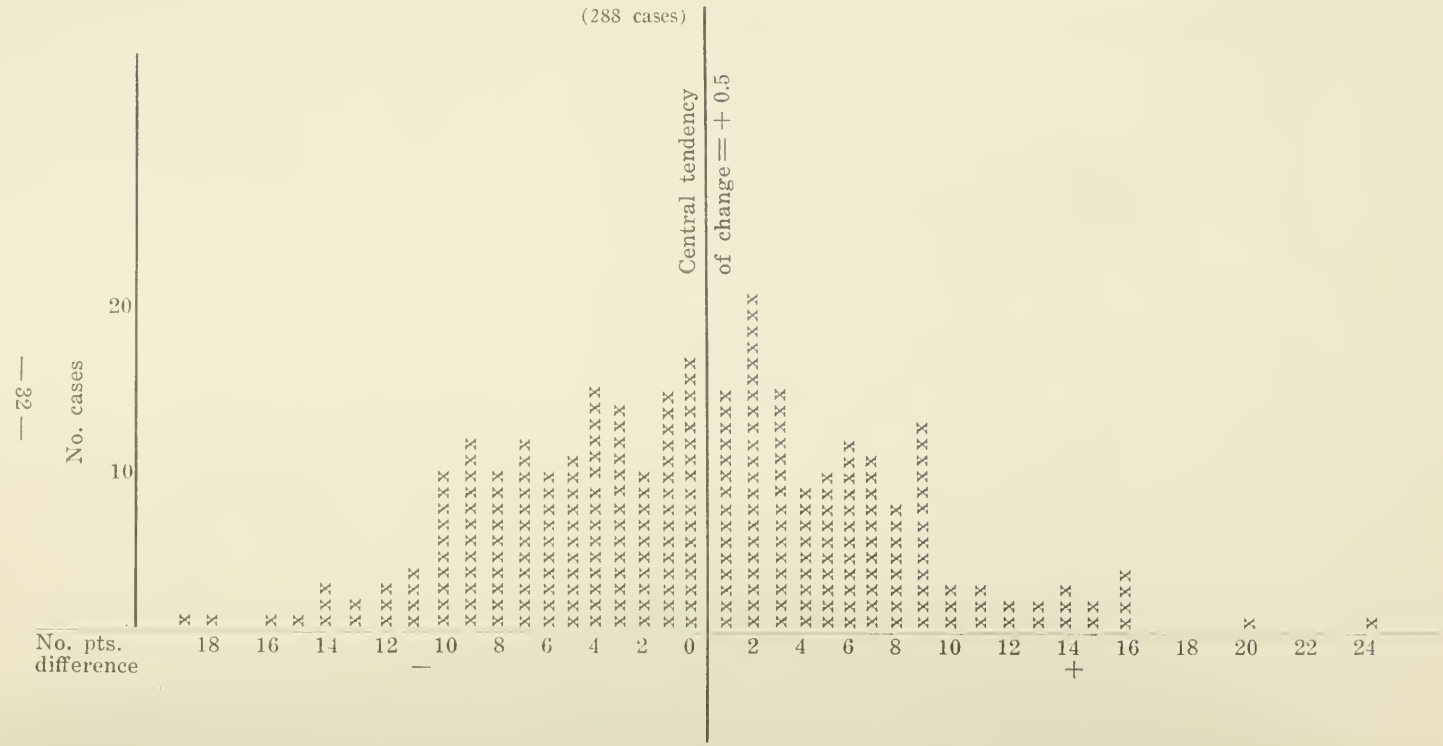
Stenquist	.72 (274 cases)	Cuneo & Terman	.85 (31 cases)
Rugg & Colloton	.84 (137 cases)		.94 (21 cases)
Terman	.93 (435 cases)		.95 (25 cases)

† By "central tendency of change" is meant the median difference between first and second test results found from a complete distribution ranging from the highest positive difference (i. e., the greatest increase found in the second test result) to the highest negative difference (i. e., the greatest decrease found in the second test result). This median or central tendency was +0.5 point. The middle 50% of changes, or inter-quartile range, in this same distribution extended from 5.6 points below 0 to 4.4 points above 0. (See graph on pag 32, showing distribution.)

‡ cf. also J. Ed. Psych., Sept., 1921, in which the following findings are noted of percentage of differences exceeding 10:

Rugg & Colloton	12.0% (137 cases)
Garrison	6.0% (62 cases)
Terman	15.0% (435 cases)

DISTRIBUTION OF CHANGES IN I. Q. BETWEEN FIRST AND SECOND TESTS.



Central tendency of change = + 0.5
Middle 50% of changes: −5.6 to +4.4
Median difference (irrespective of sign) = 5.1
Average difference (irrespective of sign) = 5.6

1. Do these large differences occur more frequently in any one age group than in another?

2. To what extent does a language difficulty appear to have any influence on the result of the first test?

3. Does the group include any psychopathic cases?

4. Did both tests fully explore the child's mentality?

5. Is there any relation between large differences in I. Q. and the time interval between tests?

6. Did both examiners have a fair amount of experience?

Data indicating answers to these questions are compiled in the table below:

Analysis of 34 Cases Showing Difference Between First and Second Tests of More Than 10 Points.

	4 yrs. to 6 yrs. 11 mos. (129 cases)	7 yrs. to 9 yrs. 11 mos. (110 cases)	10 yrs. or more (49 cases)	Totals (288 cases)
Foreign language difficulty	13	4	0	17
1 or both tests not complete	2	2	2	6
Psychopathic cases	3	0	0	3
No apparent cause for disagreement	5	1	2	8
Total	23	7	4	34

Range of time interval = 4 mos. to 33 mos.
Median time interval = 13.5 mos.

Examiners { Both certificated : 13 cases
1 or both not certificated : 21 cases

Note that 23 of the 34 cases analyzed above occur in the youngest age group (4 yrs. to 6 yrs. 11 mos.); moreover, 13 of these were designated by the examiners as showing a distinct language difficulty when the first test was given at the time of entering school, and thus were not able to reveal the full extent of their mentality until they had received definite help in thought expression in English through school experience. However, in the same age group (considering the total number of 129 cases ranging from 4 yrs. to 6 yrs. 11 mos.) are included 30 children who likewise came from foreign homes with a distinct foreign influence, but who, by the time the first mental test was given, had had contact with English speaking children outside of their own homes sufficient to eliminate the language difficulty. In these cases the two tests made of the same child show a difference of not more than 9 points with a median change of 5.0. The indications are, therefore, that in 13 cases out of 34 (38.2%) the large discrepancy between two test results was definitely due to a lack of ability to understand or to speak the language in which the test was given. Hence the factor of language difficulty should be taken into consideration in those schools where this condition is frequently encountered when children enter the kindergarten or first grade. In a cosmopolitan community, however, it is not of sufficiently serious import to lessen the value of a general program of mental testing.

Further significance may be attached to the fact that of the 34 cases showing large discrepancies, 21 involve tests of which one or both were made by examiners in the early stages of their experience previous to certification, and hence can not be credited with unquestioned accuracy. The coupling of this fact with the other considerations of psychopathic conditions, failure

to explore fully the child's mentality (see table on page 33) as well as that of language difficulty already discussed is clearly indicative of the reasons for the existence of these 34 cases. Out of a total of 288 retests, only 8 (2.7% of the whole group) show a disagreement of more than 10 points without apparent cause for the discrepancy. The high correlation (.90) existing in the complete series, as well as the comparatively small median difference (5.0 points) found between first and second tests, serves to insure a high degree of reliability for the test itself, and to increase confidence in its use.

SECTION 5.

RELIABILITY OF GROUP MENTAL TESTS

Evidence has been established that the individual mental test is an instrument of great reliability in determining the grade in which a child can do satisfactory school work. The time needed for its administration, however, is a factor which makes its exclusive use for this purpose impractical. Group mental tests, which make possible the examination of a whole class at once, have accordingly come into current use as a means for school classification on the basis of capacity. The question immediately arises: How does the group intelligence test compare with the individual test in reliability for purposes of segregation and prediction of school success? It is self-evident that external factors such as indisposition, nervousness, and opportunities for momentary distraction cannot be so easily controlled when dealing impersonally with a group of 50 people as is possible with a single individual; and insofar as any one pupil in the group of 50 is affected by any one of these factors, just so far is the group test unreliable for that particular child. A group mental test is essentially what its name implies; i. e., an instrument for measuring the capacity of a group of people taken as a whole. Due caution is necessary in the interpretation of the results gained by any single individual within the group. Such caution may be observed through checking up the test results with the teacher's estimate of the child's school work, as well as of his capacity and application; his school classification should come only as the result of the composite rating thus obtained.

With due consideration of such possible individual exceptions where external factors have vitiated test results, continued usage of the group mental test has proven it to be on the whole a very satisfactory basis for estimating pupil capacity. Close relationships exist (1) between test scores and teachers' estimates of school work at the time of taking the test; and (2) between test scores and actual accomplishment in school work during the year following the test. Both these relationships are shown in the following pages.

Relationship Between Group Test Score and Quality of School Work

Army Alpha Test.—The Army Alpha test was given to a H-8 grade class of 1097 pupils. Before the test, each pupil was rated by his teachers on the 7-point* scale as to the quality of school work. Results proved the

*A = Very Superior
B = Superior
C+ = Slightly Above Average
C = Average
C— = Slightly Below Average
D = Inferior
E = Very Inferior

direct relationship which existed between the test scores and the kind of work children do in school. The following table gives the median scores for the children doing the various types of school work as rated by the teachers:

Rating in School Work		Median Alpha Score	No. of Pupils
A	(Very Superior)	115	16
B	(Superior)	96	121
C+	(Slightly above average)	85	261
C	(Average)	75	348
C—	(Slightly below average)	69	240
D	(Inferior)	60	92
E	(Very inferior)	52	19
All children		76	1097

Note.—Read the table thus: the 16 pupils who were rated by their teachers as very superior in school work made a median score of 115 on the Army Alpha test; the 121 children who were rated superior made a median score of 96, etc.

The figures in the above table show that the lower ratings in school work are accompanied consistently by increasingly inferior test scores; it appears, therefore, that the type of work to be expected from a group of children can be determined to a large extent on the basis of the Alpha score.

Otis Test.—The Otis Group Intelligence test* was given to 849 H-8 grade pupils. Teachers' ratings of school work were again compared with the test scores, with the following results:

Otis Score and Rating in School Work

Group Test Rating	No. Children	A	B	C+	C	C—	D	E
Superior		%	%	%	%	%	%	%
100 and above (abbreviated Otis test)	228	7.0	25.0	39.0	22.0	6.0	1.0	0.0
Average 70-99 (abbreviated Otis test)	391	1.0	11.0	24.0	43.7	17.0	3.0	0.3
Inferior Below 70 (abbreviated Otis test)	230	0.0	1.0	14.0	32.0	28.0	20.0	5.0
Total	849							

Note.—Read the table thus: of the children who made a superior score** (above 100) on the Otis test, 7.0% were rated A (very superior) in school work; 25.0% were rated B (superior) in school work, etc.

A brief study of the percentages given in the preceding table brings out the following facts:

1. None of the 228 children in the superior group (above 100 in Otis test) do very inferior work, and only 1.0% do inferior work.

2. None of the 230 children in the inferior group (below 70 in Otis test) do very superior work and only 1.0% do superior work.

3. Of the mentally superior group, only 7.0% are rated C—, D, or E (i. e., below average) in school work, while in the mentally inferior group 53.0% do work that is rated below average.

* An abbreviated edition of the Otis Group test was used, including tests 2, 3, 4, 5, 7, and 8 of the series as published by the World Book Co.

** Of the 849 cases 27% scored 100 or above; 46%, 70 to 99 inclusive; 27%, below 70.

4. Of the mentally superior group, 71.0% do work that is rated A, B, or C+ (i. e., above average), while in the inferior group only 15.0% do work that is above average.

It is apparent from these percentages that the score made by a child in the Otis test bears a very definite relationship to the kind of school work he does. A pupil who scores high in only 1 case out of 100 does inferior school work, while a pupil who scores low has only 1 chance out of 100 to do superior school work.

Terman Group Test.—The Terman Group Test of Mental Ability was given to a group of 262 H-9 grade students preparatory to their entering the tenth grade of the Senior High School. On the basis of the test score, a Group Intelligence Quotient (G. I. Q.)* was computed for each child, and a study followed of the relationship of this G. I. Q. to the amount and quality of credit with which the child entered the Senior High School. The results of such study are given in the table below:

Mental Rating According to G. I. Q.	No. pupils	Av. no. units† presented for Senior High School entrance	Quality of Entrance Credit		
			% of 1's	% of 2's	% of 3's
A (130 or above)	13	4.9	44.4	48.6	4.5
B (115-129)	60	4.8	31.0	53.9	15.1
C+(105-114)	63	4.6	18.8	50.8	30.4
C (95-104)	67	4.3	12.4	52.1	35.4
C—(85-94)	41	4.0	9.5	49.3	41.2
D (70-84)	18	3.3	4.9	24.7	70.4
E (69 or below)	0	....	.....	.....	.....

Note.—Read the table thus: for the 13 pupils who, according to the Terman Group test, had a G. I. Q. of 130 or above, the average number of units† earned during the ninth year was 4.9; of the total number of credits earned by these pupils 44.4% were given the school mark of "1" (Excellent); 48.6% were marked "2" (Satisfactory); 4.5% were marked "3" (Passed).

Several outstanding facts in this table are significant:

1. The average number of units presented for high school entrance steadily decreases as the G. I. Q. decreases. It is evident that the pupils who made the inferior test scores were not able to accomplish as much in the ninth grade as those with the higher scores.

2. The percentage of "1's" in school work decreases from 44.4% for the mentally very superior group to 4.9% for the mentally inferior group. Clearly those who make low tests scores are not succeeding in doing excellent school work.

3. Seventy and four-tenths per cent of the marks earned by the group testing D in capacity were barely of passing grade, while only 4.5% were of this type for the group testing A in capacity.

4. The general findings indicate that the higher a child's test score, the higher the quality of his school work, and vice versa.

* A Group Intelligence Quotient (G. I. Q.) is computed on the basis of mental age equivalents for group test scores, as determined by standardized procedure. The G. I. Q. is only approximate, however, and not so reliable as the I. Q. obtained by an individual mental test.

† Each unit represents the completion of a year's work in a given subject.

Relation Between Test Score and Subsequent School Work.

This same class of 262 ninth grade pupils were followed into their tenth grade work. Two factors were considered: (1) the type of course taken in the Senior High School; (2) the quality of the Senior High School work during the first seven weeks of the term. The findings are given below:

(1) Type of course taken in the Senior High School.

Mental Rating According to G. I. Q.	No. pupils	Academic No. pupils	Academic % pupils	Commercial No. pupils	Commercial % pupils	Vocational No. pupils	Vocational % pupils
A (130 or above)	13	13	100.0	0	0.0	0	0.0
B (115-129)	60	57	95.0	2	3.3	1	1.7
C+(105-114)	63	55	87.3	7	11.1	1	1.6
C (95-104)	67	46	68.6	18	26.9	3	4.5
C—(85-94)	41	25	61.0	11	26.8	5	12.2
D (70-84)	18	12	66.7	6	33.3	0	0.0
E (Below 70)	0	....	.....	....	.....	..	.....

(2) Quality of Senior High School work during first period of 7 weeks.

Mental Rating According to G. I. Q.	No. pupils	% of 1's*	% of 2's*	% of 3's*	% of 4's, 5's or Inc.*
A (130 or above)	13	24.5	54.4	10.5	10.4
B (115-129)	60	10.9	55.9	23.1	10.0
C+(105-114)	63	8.7	34.2	37.4	19.4
C (95-104)	67	2.8	38.9	36.5	21.6
C—(85-94)	41	7.5	38.0	39.0	15.4
D (70-84)	18	0.0	32.8	43.2	23.7
E (Below 70)	0	.....	.....	.....	.....

The above tables show two definite tendencies: (1) that the pupils having high mental ratings almost universally enroll in the academic course, while pupils having low ratings tend more often to take up the commercial and vocational work; (2) that the percentage of excellent marks received in the tenth grade very rapidly diminishes with the decrease of the G. I. Q. rating as determined at the end of the ninth year, while the percentages of barely passing (3) and unsatisfactory marks (4, 5, or incomplete) materially increase as the intelligence rating grows lower.

Evidently the group mental test possesses distinct value in analyzing the mental capacity of a group of students, as well as in predicting their probable success or failure in various types of school work. Where lack of time prevents the general use of the individual test as a means of analysis and segregation, very satisfactory results can be obtained on the whole through utilizing the less expensive instrument of the group intelligence test;—always with the real need, however, of studying and checking every doubtful case through comparison of the test result with all other factors involved, such as: quality of school work, teacher's estimate of intelligence, industry and application, health, interests, and out-of-school requirements and activities.

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* 1=Excellent.
2=Satisfactory.
3=Passing.
4=Condition.
5=Faliure.
Inc.=Incomplete.

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SECTION 6.

SCHOOL ORGANIZATION AND CLASSIFICATION WITH REFERENCE TO INDIVIDUAL DIFFERENCES

It is evident from the preceding sections of this study that the mental test is a valuable tool to use in the guidance and classification of school children. It seems advisable here to discuss some of the features of school administration adapted to care for such individual differences as have been discussed.

No single rule can regulate the classification of a school according to the capacity of pupils to learn: no two schools can be treated exactly alike: the machinery must be subject to constant adjustment. A general principle may be stated as follows: "Find the mental capacity of the pupil and place him where he belongs, taking careful consideration of his age, former accomplishment in school, industry, interest, health, and any other condition which is known to have a bearing upon his proper placement." To attempt to define specifically what shall be done has a tendency to make for mechanical treatment of children, while what must be kept uppermost is that the individual needs of each child should be met as nearly as possible. The school must come more and more to consider individuals rather than masses or groups. However, for the sake of having a common language for administrative practice, we shall define four general types of classes varying from normal: atypical, limited, opportunity, accelerated. These classes, all called "special classes," differ from the regular groups in that they are permitted to vary either the content of the course of study, or the rate of progress, or both:

Special Atypical Classes.

The most apparent need (please note that I say the "most apparent," not the greatest) in our school system is that which concerns itself with the proper treatment of the very inferior child who seems altogether unable to profit by the instruction in the regular classes. For such pupils so-called "special atypical classes" have been organized, each one limited to an enrollment of 16 pupils, where the instruction given becomes largely individual. Any pupil may be a candidate for one of these classes who is over-age and slow, and who shows, both by school record and mental test, that he stands much below normal and that he appears quite unable to work successfully with the regular class. It is important to note that the results of the mental tests are not sufficient for making assignments; there must be the corroboration through other data, such as the teacher's judgment of the child's school work, as well as her estimate of his intelligence; a most careful study is likewise made of physical and environmental conditions.*

* Data recently issued (1921) showed the following facts for 336 pupils working in atypical classes:

Median chronological age = 13-5
Median mental age = 8-8
Median I. Q. = 68
Median mental retardation = 4½ years.

The purpose of the special class instruction for these pupils is:

(1) To give each pupil as much of the standard curriculum as he can take with regular effort.

(2) To give more work of manual nature than he can be given in regular classes.

(3) To discover and to train any special ability that each child may show which will enable him to become a useful member of society, partially or wholly self-supporting.

(4) To instill proper attitudes toward all problems of citizenship and life in general.

It is not the purpose of the special atypical class to coach up a child to enter the regular grade again, though if a child shows at any time ability to do work with a regular class in a manner that is at all satisfactory, he is transferred to such a class.

No definite course of study is fixed. All are taught reading, writing, language, and number work in so far as their capacities permit them to go without spending a very unreasonable amount of time. Approximately one-half the time is spent in some form of manual work; the following are the types of work commonly found: rug weaving; making paper candle shades, electric light shades, nut cups, reed baskets, raffia work, pine needle baskets and trays, hearth brooms, brushes, toys (aeroplanes, animals, etc.); sewing for girls (aprons, dresses, etc.); where equipment permits, practical lessons in simple cooking and care of home; chair caning and shoe cobbling (only in a few schools).

This type of special class has proven decidedly successful, as well as absolutely necessary for the handling of certain types of school problems. The normal class and teacher are relieved of a drag; the pupil, doing work adjusted to his particular needs under the direction of a specially trained teacher, is made happier and more contented, with a greater opportunity for developing to the maximum even that limited capacity with which he has been endowed.

Special Limited Classes.

When the extremely inferior child has been eliminated from the regular classroom through the organization of such classes as described above, there still remains a problem of inferiority to be considered; i. e., the child who is so slow or dull mentally that he cannot keep pace with normal class work, but is still able to make some progress with the essentials of grade work, though at a slower rate of speed. Such children, if held to the rigid standard of regular grades, would move up so slowly that they would reach the compulsory age limit and would pass out into the industrial world long before finishing the elementary grades. Hence there comes the value of organizing for these pupils so-called "Special Limited Classes," for which the course of study is slightly modified, consisting of what might be termed a minimum course. The pupils enrolled are given only the most essential parts of the regular curriculum for the grade. They are then promoted from term to term from one limited class to the limited class of the next grade higher.

Where it is impossible to organize a separate limited class for each grade, two grades can be combined, such as, 1st and 2nd Limited, 3rd and 4th

Limited, etc. In any case the enrollment of these classes should be kept considerably below the standard for normal groups. The segregation of the slower pupils makes it possible to increase the size of the regular class, thus necessitating no additional teaching force. Thus segregated, the pupils of both divisions have been found to work better, behave better, and accomplish more.

Special limited classes are planned for pupils from the first grade through their school course. They pass from the limited first to the limited second to the limited third, etc., from year to year, progressing steadily, but one or more years over age. They progress, not because they have covered standard first, second, or third grade work, but because they ought to pass up through the grades to the best of their ability, getting as much as they can as they advance, and finally reaching some of the features of upper grade work which are most essential in preparing this type of pupil for an early introduction into industrial life and citizenship. Our problem is to give them the best education which the schools can give up to the age of sixteen. It is not the problem of what grade they shall work in or finish, but what education we can give which will best fit them for citizenship. Special limited divisions are organized in our Junior High Schools and are beginning in the Senior High School.

Special Opportunity Classes.

Special opportunity classes are designed for those children who have at least normal mental capacity, but because of lack of progress due to illness, moving about, or other causes, are working in grades below where they should be. The purpose of these classes is to give such help as is needed to adjust the pupil as quickly as possible to take up with a regular class the work which fits his capacity and needs. One such group for a large school is all that is needed, and its enrollment will be changing from month to month, or from week to week, as pupils are ready to move into the regular grades.

Special Accelerated Classes.

With the elimination from the regular classes and provision for special instruction of all problem cases where the pupil concerned is below standard accomplishment, some have thought that the responsibility of the school is well met. However, there remains a very important section of our school population still unprovided for, i. e., those superior pupils whose mental capacity is beyond that of the grade in which they are placed. These are the children from whom the greatest accomplishment should be expected, and who should become the leaders of tomorrow. Many of them are marking time throughout their elementary course and thus forming habits of indolence that will in many cases affect all future success. By segregation into special classes or through some individual guidance by the teacher herself, such pupils may accomplish either one of two things: (1) save from one to two years of time in graduating from the elementary school; (2) cover an enriched curriculum at practically the normal pace.

The present standard curriculum is supposedly based on the ability of the average child. Hence school classification on the basis of individual needs must recognize the tremendous need of the superior pupil to whom the mastery of the standard curriculum is child's play, and who must be

trained to use his powers to their maximum capacity. The problem may be met in one of two ways:

(1) By individual attention, where numerous class divisions do not exist. The superior child may do enriched work in the regular class, or he may work at a more rapid pace, or he may do something of both.

(2) By segregation into groups. Here the curriculum may be broadened for the whole class, or the class may cover two terms' work in one semester, as circumstances seem to recommend.

Segregation in High Schools.

The policy of segregation does not stop with the elementary school. The very fact that these limited class pupils are carried on up through the grades means that the Junior High School and Senior High School must receive a large number of pupils who formerly left school before completing the elementary grades. These pupils are clearly not capable of carrying the standard course as prescribed in our regular high schools. The high school, therefore, must make decision; it must either furnish courses of study adapted to the needs of these children, making proper classification for them, or it must give them a trial at work which they cannot do, fail them, and then pass them out. As a matter of fact, our high schools are rapidly adjusting themselves to this new problem and are making classification according to capacity and variations in courses of study, at the same time offering a large number of electives and permitting superior pupils to carry additional subjects.

It should be kept clearly in mind, however, that neither the elective system nor the additional subject plan furnishes an adequate solution to the problem of meeting the varying capacities of high school students. The fact that pupils of both high and low mentality may elect to take algebra does not mean that they can be taught satisfactorily in the same class, nor does it solve the teaching problem to permit a superior student to take Spanish as a fifth subject, only to find himself in a class with markedly inferior minds. The fact remains that dull pupils and bright pupils do not work well together in the same class. The only solution to this problem is either segregation into different groups, or variation of treatment and standards of accomplishment within the same group.

Furthermore, there is evident need of variation in the content of the course of study to meet individual differences. Pupils of limited capacity do not need merely a diluted form of algebra or Spanish. If they cannot comprehend this work, they should be given something entirely different; just what this is can be determined only by the most careful and scientific study of each individual with reference to his capacities and needs.

CHAPTER III.

SUMMARY AND CONCLUSIONS

1. The need for a better classification of school children is shown by all recent surveys of city systems in America. This need is revealed by the fact that pupils in the same grade show such a wide variation in age, capacity, accomplishment, and rate of progress.

2. A group of 186 kindergarten children show an age range from 4 years and 4 months to 7 years and 10 months, the mediam age being 5 years and 8 months. Eight and six-tenths per cent were below 5 years; 58.1% between 5 and 6 years, while 33.3% were above 6 years of age. The mental ages of these same kindergarten children range from 3 years 6 months to 8 years and 4 months, the median being 5 years and 10 months. Fifteen and six-tenths per cent were below 5 years; 39.2% between 5 and 6 years; 45.2% were above 6 years mentally.

3. The median mental capacity in the L-1 grade varies widely in different schools. In seven different schools in the same city, the median mental age of L-1 grade pupils, as shown by the individual test, was as follows: (A) 5 years and 8 months; (B) 6 years and 2 months; (C) 6 years and 4 months; (D) 6 years and 4 months; (E) 6 years and 6 months; (F) 6 years and 6 months; (G) 7 years and 0 months. Three hundred and twenty-five children are represented in this distribution; the median mental age for the entire group is 6 years and 4 months. It should be noted that the median mental age in School A is 1 year and 4 months below the median mental age in School G. This represents a difference of more than one full year-grade in capacity, yet the L-1 grade course of study in these schools was the same. Of these 325 L-1 grade children, 27.4% were below 6 years mentally; 50.1% between 6 and 7 years mentally; and 22.5% above 7 years mentally. Another group of 235 L-1 grade children, tested in another year, reveals 35.7% below 6 years mentally; 42.2% between 6 and 7 years, and 22.1% above 7 years mentally. These two rather large groups of L-1 grade children (representing all of the children attending in this grade in the schools where the tests were made, therefore not a selected group) both point to the same conclusion; i. e., that approximately 50% of L-1 grade children test between 6 and 7 years mentally and that more than one-fourth of the children have mental ages below 6 years and that almost one-fourth have mental ages above 7 years.

4. One hundred and seventy-one H-1 grade children show an age range from 5 years and 10 months to 12 years and 2 months; a mental age range from 4 years 8 months to 9 years and 0 months. (The median chronological age was 7 years and 6 months; the median mental age was 6 years and 6 months. Therefore, this group is distinctly inferior.) Chronological over-ageness begins to show prominently in the H-1 grade. Sixty-seven and eight-tenths per cent of these children were over 7 years of age, while only 29.8% were above 7 years mentally. This means that 38% of this group of children were over-age and dull. They were discovered before finishing the first grade

and were held back. On the other hand, 30% test above 7 years mentally—a capacity equal to the next grade higher. They had not been discovered and moved ahead. Should not the rule be made to work both ways?

5. About 90% of the children in the first grade who test below 6 years mentally either fail of promotion or are passed on because of over-ageness although the work is unsatisfactory. In some schools where the general average of mentality is very low the standard for passing work is correspondingly low, thus making the percentage of pupils passing or failing much the same as in another school where conditions are more nearly normal. Likewise in schools where the general average of mentality is very high, the standards are raised again, making percentages of success or failure similar to normal. The universal tendency is to bring the extremes of a distribution toward the mode or median and also to base promotion or failure upon the time of service in a given grade.

6. A follow-up for a period of 2 years revealed the fact that children in the kindergarten, testing with an I. Q. below 90, failed to make normal progress in 76 cases out of 100. They made normal progress in 23 cases out of 100; and no one made rapid progress. On the other hand, those testing with an I. Q. of 110 or above showed rapid progress in 32 cases out of 100; and slow progress in less than 9 cases out of 100. Likewise children in the L-1 grade testing with an I. Q. below 90, showed slow progress in 87 cases out of 100; while those above 110 I. Q. showed rapid progress in 53 cases out of 100. In the H-1 grade those testing below 90 I. Q. showed slow progress in 86 cases out of 100; while those testing above 110 I. Q. showed rapid progress in 83 cases out of 100. Thirty-five first grade children testing below 90 I. Q. were followed for a period of 4½ years; 94.6% failed to make normal progress in school. Clearly a low I. Q. and a high I. Q. have definite prognostic value with reference to the progress of a child for the two years following his test in kindergarten or first grade. The tests in the kindergarten did not have as high prognostic value as those in L-1 or H-1.

7. A comparison of the child's mental age at the close of the 2 years' follow-up period with his grade location at that time showed that, of the kindergarten group, only 46.0% were mentally at-age for the grade 2 years after the test was given; of the L-1 children, 48.5% were mentally at-age, and of the H-1 group, 44.4%. The rest of the children (between 50.0% and 60.0% of each group) were either mentally under-age, with most of them doing inferior work in the grade in which they were placed, or else they were mentally over-age for the grade, with the majority of them through superior school work giving evidence of mental capacity beyond the average.

8. Predictions as to school progress—rapid, normal, or slow—were made for 52 first grade children at the time of test. A follow-up 4½ years later proved predictions true in 77.8% of the cases. In 18% of the cases the failure of the prediction to hold true was explained on the basis of absence, or illness, or environmental hindrance. Therefore, the prediction made in the first grade was valid for 96% of the cases at the end of a period of 4½ years.

9 . Mental age is a fair index of a child's ability to do first grade work Correlation between M. A. and teachers' ratings in school work for 149 firs grade children was .725 (Pearson).

10. Of the 261 kindergarten and first grade children who were locate in the schools two years after the test, 50.5% were already chronologically over-age for the grade, even though they had not yet finished third grad work; 37.9% were both over-age and low in mentality. Low mentality i undoubtedly the predominating factor in producing failure in these grade of school.

11. Reliability of the individual test (Stanford Revision) is shown b 288 retests. The range of time between first and second tests varied fro 1 month to 3 years. The coefficient of correlation between first and secon tests was .90 (Pearson). The median difference in I. Q. was 5.1 points. Th second test averaged only 0.5 of a point in I. Q. above the first. In othe words, the second test is below the first about as often as it is above it.

12. Group mental tests in the upper elementary grades and in the hig school have a distinct value in analyzing the capacity of students to do scho work. They should be used to assist in segregating pupils into capacit groups for class instruction. Five general types of classes possible in a larg school organization are as follows: (1) atypical, for the lowest mentality (2) limited, for the dull mentally; (3) opportunity, for those who shoul make up work lost by illness or absence; (4) normal; (5) accelerated, fo those who should move faster or cover an enriched curriculum.

13. The junior high and senior high school curricula should be change to fit the needs of pupils of limited mental capacity. Elective subjects an slow or rapid classes in the same subject will not meet the need. The limite pupil demands a different course of study. In the elementary grades th curriculum for limited pupils should be made simpler, but similar to tha of the regular grades.

14. A well organized program for mental testing should be an integr part of every school system. Every child should be given an individual tes as soon after entering school as possible (not later than the middle of th first term if he speaks English). Group mental tests should be given to a children at intervals not greater than two years, followed by individual tes of all problem or disagreement cases. These test results should be used wit all other available data in the classification and guidance of pupils in scho work.

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